

S.O. 34765
Report of Test 6810-10-CF-DA
for
BLACK MEDIA WORKS, INC.
WJFP 91.1 MHz FORT PIERCE, FL.

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6810-10-CF-DA to meet the needs of WJFP and to comply with the requirements of the FCC construction permit, file number BMPED-20170421AAI. This test characterizes only the radiation characteristics of the antenna when mounted on the tower as described. It does not represent or imply any guarantee of specific coverage which can be influenced by factors beyond the scope of this test.

RESULTS:

The following Figures are the results of the measurements from our pattern range:

- Figure 1A - Measured Azimuth Pattern with the FCC Composite
- Figure 1B - Measured Composite Azimuth Pattern with the FCC Composite
- Figure 1C - Tabulation of the Horizontal Polarization for the Measured Azimuth Pattern
- Figure 1D - Tabulation of the Vertical Polarization for the Measured Azimuth Pattern
- Figure 1E - Tabulation of the Measured Composite Azimuth Pattern
- Figure 1F - Tabulation of the FCC Composite

The calculated elevation pattern of the antenna is shown in Figure 3.

Construction permit file number BMPED-20170421AAI indicates that the Horizontal radiation component shall not exceed 85 kW at any azimuth and is restricted to the following values at the azimuths specified:

290 - 300 Degrees True: 4.3 kilowatts

From Figure 1A, the maximum radiation of the Horizontal component occurs at 62 Degrees True to 154 Degrees True. At the restricted azimuth of 290 Degrees True to 300 Degrees True the Horizontal component is 13.94 dB down from the maximum of 85 kW, or 3.434 kW.

The R.M.S. of the Horizontal component is 0.772. The total Horizontal power gain is 9.803. The R.M.S. of the Vertical component is 0.746. The total Vertical power gain is 9.550. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.821. The R.M.S. of the measured composite pattern is 0.773. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.698. Therefore this pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

METHOD OF DIRECTIONALIZATION:

One bay of the 6810-10-CF-DA was mounted on a tower of precise scale to the 43.875-inch face tower at the WJFP site. The spacing of the antenna to the tower was varied to achieve the vertical pattern shown in Figure 1A. A horizontal parasitic element was placed directly under the bay. The position of this horizontal parasitic element was changed until the horizontal pattern shown in Figure 1A was achieved. See Figure 2 for mechanical details.

METHOD OF MEASUREMENT:

As allowed by the construction permit, file number BMPED-20170421AAI, a single level of the 6810-10-CF-DA was set up on the Shively Labs scale model antenna pattern measuring range. A scale of 4.5:1 was used.

EQUIPMENT:

The 4.5:1 scale model pattern range consists of a wooden rotating pedestal equipped with a position indicator. The scale model bay is placed on the top of this pedestal and is used in the transmission mode at approximately 20 feet above ground level. The receiving corner reflector is spaced 50 feet away from the rotating pedestal at the same level above ground as the transmitting model. The transmitting and receiving signals are carried to a control building by means of RG-9/U double shielded coax cable.

The control building is equipped with:

Hewlett Packard Model 4395-A Network Analyzer

PC Based Controller

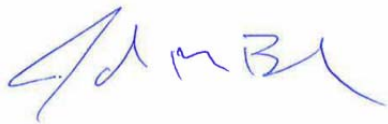
Output Standard Printer or 'pdf'

All testing is carried out in strict accordance with approved procedures under our ISO9001:2008.

TEST PROCEDURES:

The receiving antenna system is mounted so that the horizontal and vertical azimuth patterns are measured independently. The network analyzer was set to 409.95 MHz Calibrated pads are used to check the linearity of the measuring system. For example, 6 dB padding yields a scale reading of 50 from an unpadded reading of 100 in voltage. From the recorded patterns, the R.M.S. values are calculated and recorded as shown in Figure 1A.

Respectfully submitted by:

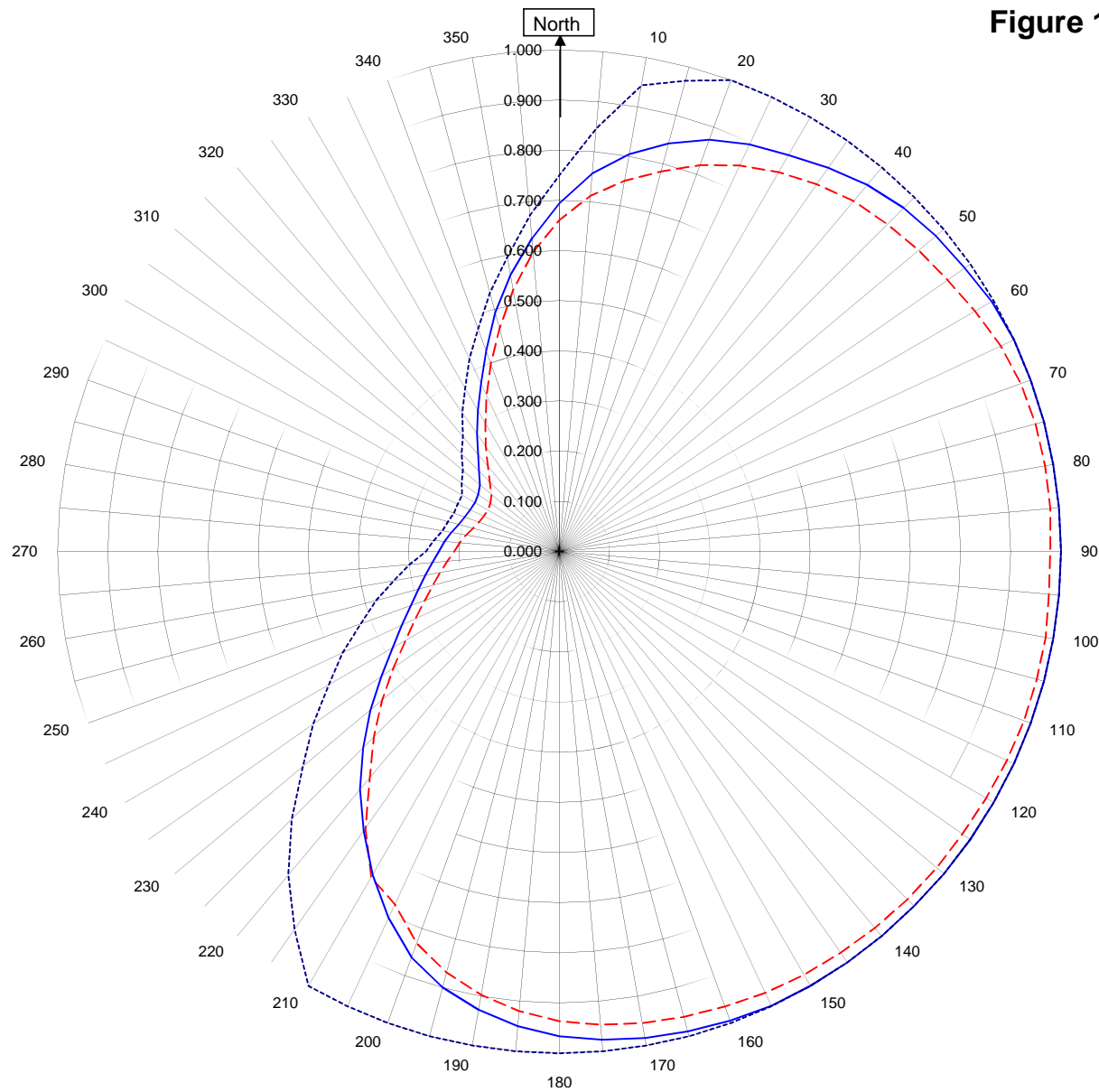
A handwritten signature in blue ink, appearing to read 'JMB', is written over a light blue circular stamp.

John M. Bliss
Vice President, Operations
S/O 34765
Date July 18, 2017

Shively Labs

Shively Labs, a division of Howell Laboratories, Inc. Bridgton, ME (207)647-3327

Figure 1A



WJFP FORT PIERCE, FL.
34765
July 18, 2017

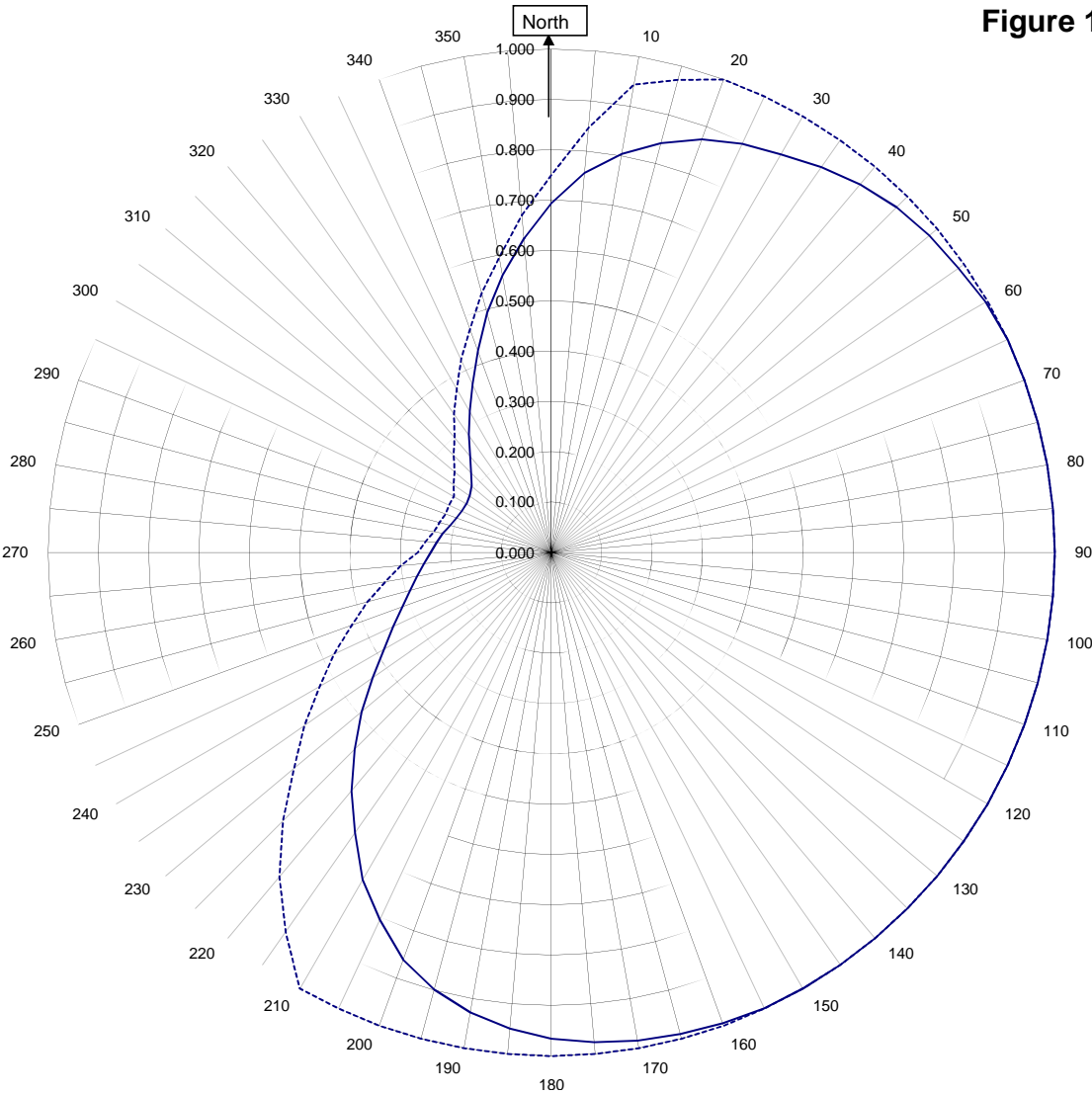
Horizontal RMS	0.772	Frequency	91.1 / 409.95 MHz
Vertical RMS	0.746	Plot	Relative Field
H/V Composite RMS	0.773	Scale	4.5 : 1
FCC Composite RMS	0.821	See Figure 2 for Mechanical Details	

Antenna Model	6810-10-CF-DA
Pattern Type	Directional Azimuth

Shively Labs

Shively Labs, a division of Howell Laboratories, Inc. Bridgton, ME (207)647-3327

Figure 1B



WJFP FORT PIERCE, FL.
34765
July 18, 2017

—————H/VComposite RMS	0.773	Frequency	91.1 / 409.95 mHz
.....FCC Composite RMS	0.821	Plot	Relative Field
		Scale	4.5 : 1
			See Figure 2 for Mechanical Details

Antenna Model	6810-10-CF-DA
Pattern Type	Directional H/V Composite

Figure 1C

Tabulation of Horizontal Azimuth Pattern
WJFP FORT PIERCE, FL.

Azimuth	Rel Field	Azimuth	Rel Field
0	0.694	180	0.966
10	0.804	190	0.927
20	0.874	200	0.861
30	0.913	210	0.744
40	0.954	220	0.618
45	0.970	225	0.553
50	0.980	230	0.492
60	0.996	240	0.384
70	1.000	250	0.315
80	1.000	260	0.272
90	1.000	270	0.240
100	1.000	280	0.219
110	1.000	290	0.201
120	1.000	300	0.194
130	1.000	310	0.207
135	1.000	315	0.226
140	1.000	320	0.252
150	1.000	330	0.325
160	0.995	340	0.427
170	0.984	350	0.560

Figure 1D

Tabulation of Vertical Azimuth Pattern
WJFP FORT PIERCE, FL.

Azimuth	Rel Field	Azimuth	Rel Field
0	0.661	180	0.936
10	0.751	190	0.897
20	0.820	200	0.831
30	0.874	210	0.750
40	0.913	220	0.588
45	0.924	225	0.523
50	0.935	230	0.462
60	0.958	240	0.354
70	0.979	250	0.285
80	0.984	260	0.242
90	0.979	270	0.210
100	0.984	280	0.189
110	0.986	290	0.171
120	0.982	300	0.164
130	0.981	310	0.177
135	0.981	315	0.196
140	0.979	320	0.222
150	0.974	330	0.295
160	0.965	340	0.399
170	0.954	350	0.530

Figure 1E

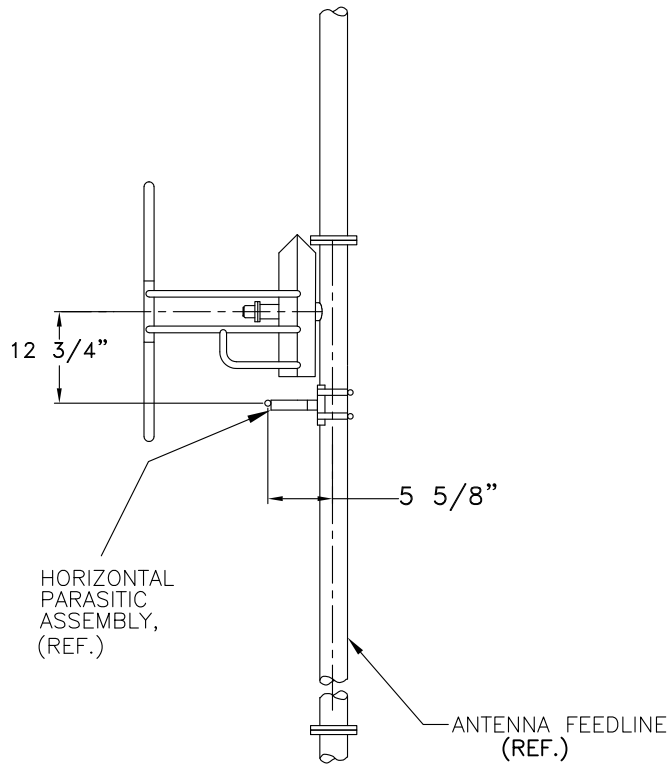
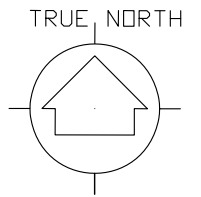
Tabulation of Composite Azimuth Pattern
WJFP FORT PIERCE, FL.

Azimuth	Rel Field	Azimuth	Rel Field
0	0.694	180	0.966
10	0.804	190	0.927
20	0.874	200	0.861
30	0.913	210	0.750
40	0.954	220	0.618
45	0.970	225	0.553
50	0.980	230	0.492
60	0.996	240	0.384
70	1.000	250	0.315
80	1.000	260	0.272
90	1.000	270	0.240
100	1.000	280	0.219
110	1.000	290	0.201
120	1.000	300	0.194
130	1.000	310	0.207
135	1.000	315	0.226
140	1.000	320	0.252
150	1.000	330	0.325
160	0.995	340	0.427
170	0.984	350	0.560

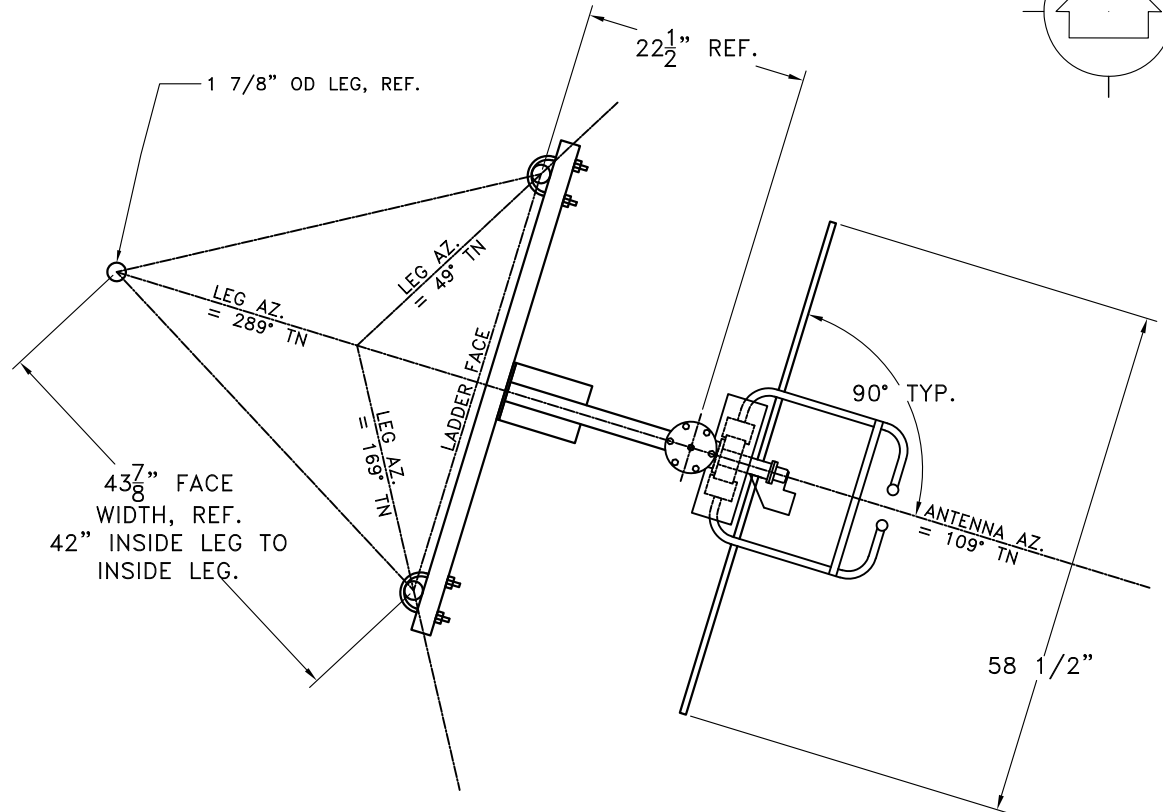
Figure 1F

Tabulation of FCC Directional Composite
WJFP FORT PIERCE, FL.

Azimuth	Rel Field	Azimuth	Rel Field
0	0.750	180	1.000
10	0.944	190	1.000
20	1.000	200	1.000
30	1.000	210	1.000
40	1.000	220	0.841
50	1.000	230	0.668
60	1.000	240	0.531
70	1.000	250	0.422
80	1.000	260	0.335
90	1.000	270	0.266
100	1.000	280	0.237
110	1.000	290	0.224
120	1.000	300	0.224
130	1.000	310	0.251
140	1.000	320	0.299
150	1.000	330	0.376
160	1.000	340	0.473
170	1.000	350	0.596



SIDE VIEW



TOP VIEW
TOWER: UNKNOWN

ANTENNA HEADING 109° TRUE NORTH

SHIVELY LABS			
A DIVISION OF HOWELL LABORATORIES INC.,BRIDGTON, MAINE			
SHOP ORDER:	FREQUENCY:	SCALE:	DRAWN BY:
34765	91.1 MHz.	N.T.S.	ASP
TITLE:		APPROVED BY:	
MODEL-6810-10-DIRECTIONAL ANTENNA		DAB	
DATE:			
7-18-17	FIGURE 2		

Antenna Mfg.: Shively Labs
Antenna Type: 6810-10-CF-DA

Date: 7/18/2017

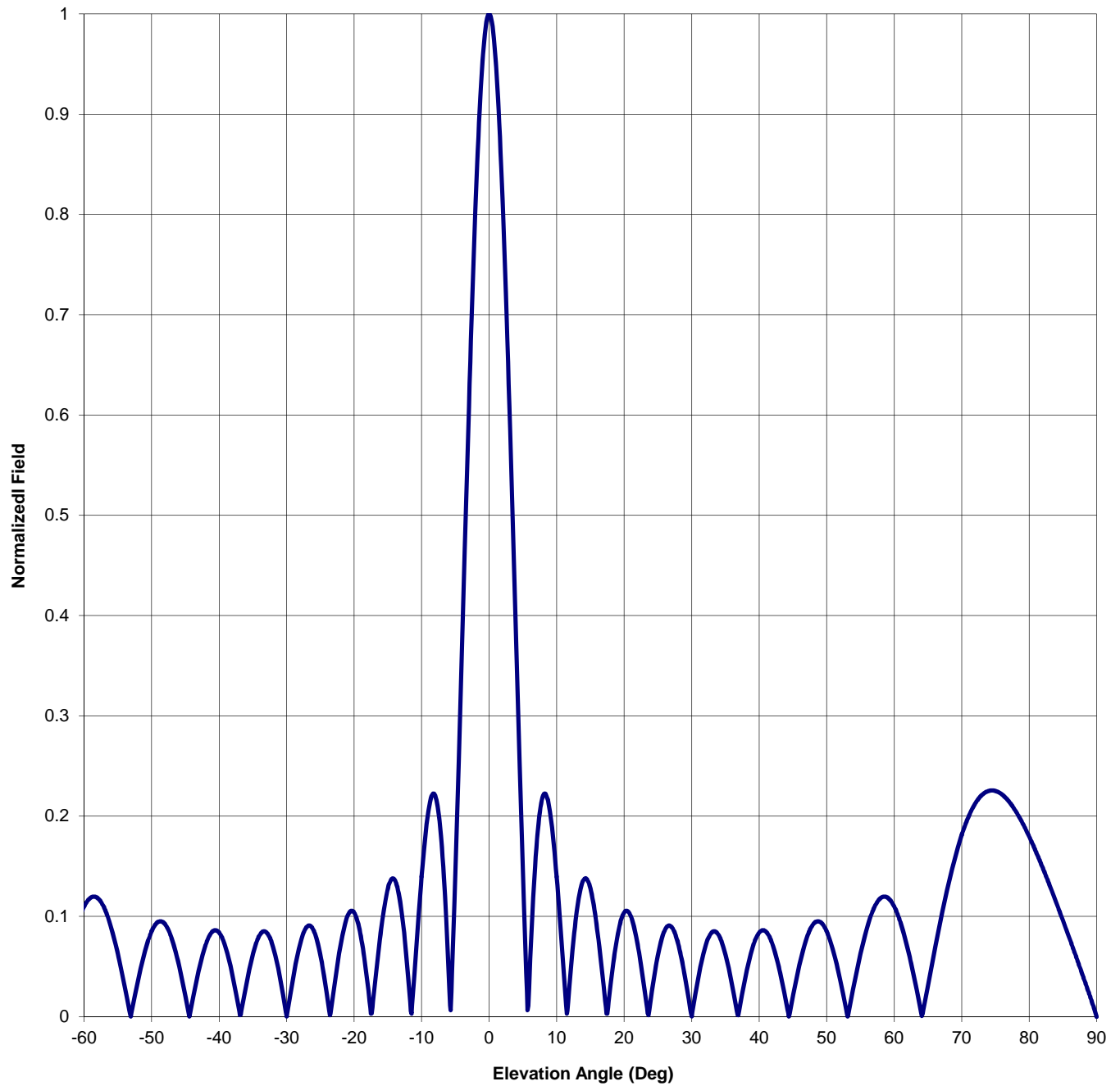
Station: WJFP

Frequency: 91.1

Channel #: 216

Figure: Figure 3

Beam Tilt	0	
Gain (Max)	9.803	9.914 dB
Gain (Horizon)	9.803	9.914 dB



Antenna Mfg.: Shively Labs
Antenna Type: 6810-10-CF-DA

Date: 7/18/2017

Station: WJFP

Beam Tilt 0

Frequency: 91.1

Gain (Max) 9.803

9.914 dB

Channel #: 216

Gain (Horizon) 9.803

9.914 dB

Figure: Figure 3

Angle of Depression (Deg)	Relative Field	Angle of Depression (Deg)	Relative Field	Angle of Depression (Deg)	Relative Field	Angle of Depression (Deg)	Relative Field
-90	0.000	-44	0.014	0	1.000	46	0.053
-89	0.021	-43	0.047	1	0.951	47	0.078
-88	0.040	-42	0.072	2	0.812	48	0.092
-87	0.059	-41	0.085	3	0.608	49	0.095
-86	0.078	-40	0.084	4	0.373	50	0.085
-85	0.096	-39	0.068	5	0.144	51	0.065
-84	0.114	-38	0.041	6	0.044	52	0.037
-83	0.131	-37	0.005	7	0.169	53	0.004
-82	0.148	-36	0.031	8	0.221	54	0.031
-81	0.165	-35	0.062	9	0.205	55	0.062
-80	0.180	-34	0.081	10	0.140	56	0.089
-79	0.193	-33	0.084	11	0.049	57	0.108
-78	0.205	-32	0.070	12	0.040	58	0.118
-77	0.215	-31	0.040	13	0.106	59	0.119
-76	0.221	-30	0.000	14	0.137	60	0.110
-75	0.225	-29	0.040	15	0.128	61	0.092
-74	0.225	-28	0.073	16	0.087	62	0.068
-73	0.221	-27	0.090	17	0.028	63	0.038
-72	0.213	-26	0.086	18	0.033	64	0.004
-71	0.199	-25	0.061	19	0.080	65	0.031
-70	0.181	-24	0.020	20	0.104	66	0.066
-69	0.158	-23	0.028	21	0.100	67	0.100
-68	0.131	-22	0.072	22	0.072	68	0.131
-67	0.100	-21	0.100	23	0.028	69	0.158
-66	0.066	-20	0.104	24	0.020	70	0.181
-65	0.031	-19	0.080	25	0.061	71	0.199
-64	0.004	-18	0.033	26	0.086	72	0.213
-63	0.038	-17	0.028	27	0.090	73	0.221
-62	0.068	-16	0.087	28	0.073	74	0.225
-61	0.092	-15	0.128	29	0.040	75	0.225
-60	0.110	-14	0.137	30	0.000	76	0.221
-59	0.119	-13	0.106	31	0.040	77	0.215
-58	0.118	-12	0.040	32	0.070	78	0.205
-57	0.108	-11	0.049	33	0.084	79	0.193
-56	0.089	-10	0.140	34	0.081	80	0.180
-55	0.062	-9	0.205	35	0.062	81	0.165
-54	0.031	-8	0.221	36	0.031	82	0.148
-53	0.004	-7	0.169	37	0.005	83	0.131
-52	0.037	-6	0.044	38	0.041	84	0.114
-51	0.065	-5	0.144	39	0.068	85	0.096
-50	0.085	-4	0.373	40	0.084	86	0.078
-49	0.095	-3	0.608	41	0.085	87	0.059
-48	0.092	-2	0.812	42	0.072	88	0.040
-47	0.078	-1	0.951	43	0.047	89	0.021
-46	0.053	0	1.000	44	0.014	90	0.000
-45	0.021			45	0.021		

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Figure 4

VALIDATION OF TOTAL POWER GAIN CALCULATION

WJFP FORT PIERCE, FL.

MODEL 6810-10-CF-DA

Elevation Gain of Antenna 5.65

Horizontal RMS value divided by the Vertical RMS value equals the Horiz. - Vert. Ratio

H RMS	0.772259	V RMS	0.746323	H/V Ratio	1.035
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Elevation Gain of Horizontal Component	5.846
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Elevation Gain of Vertical Component	5.460
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Horizontal Azimuth Gain equals $1/(\text{RMS})^2$.	1.677
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Vertical Azimuth Gain equals $1/(\text{RMS}/\text{Max Vert})^2$.	1.749
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Max. Vertical	0.987
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***Total Horizontal Power Gain is the Elevation Gain Times the Azimuth Gain**

Total Horizontal Power Gain =	9.803
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***Total Vertical Power Gain is the Elevation Gain Times the Azimuth Gain**

Total Vertical Power Gain =	9.550
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ERP divided by Horizontal Power Gain equals Antenna Input Power

85	kW ERP	Divided by H Gain	9.803	equals	8.671	kW H Antenna Input Power
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Antenna Input Power times Vertical Power Gain equals Vertical ERP

8.671	kW	Times V Gain	9.550	equals	82.804	kW V ERP
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Maximum Value of the Vertical Component squared times the Maximum ERP equals the Vertical ERP

$(0.987)^2$	Times	85.00	Equals	82.804	kW Vertical ERP
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NOTE: Calculating the ERP of the Vertical Component by two methods validates the total power gain calculations